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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/038,125	01/02/2002	Geon Choe	SJO920010040US1	7458

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EXAMINER	
CASTRO, ANGEL A	

ART UNIT	PAPER NUMBER
2653	

DATE MAILED: 06/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/038,125	CHOE, GEON	
	Examiner	Art Unit	
	Angel A. Castro	2653	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 January 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9,12 and 13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-9,12 and 13* is/are rejected.

7)☒ Claim(s) *2* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to Amendment filed 1/18/05.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3-9, 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-256621 in view of Journal of Applied Physics article "Oxygen as a surfactant in the Grow of Giant Magnetoresistive Spin Valves" to Egelhoff et al (hereinafter "Egelhoff").

JP '621 shows a method for providing precise control of magnetic coupling field in NiMn top spin valve head (see col. 2, lines 37-39 for permissible antiferromagnetic materials, specifically "NiMn" with a thickness of between "5-25 nm"), comprising: forming a copper layer (3 or 5) in a NiMn top spin valve; and depositing remaining layers (free layer 4, pinned layer 6, and antiferromagnetic layer 7) of the NiMn top spin valve head. However, JP'621 does not show the copper seed layer 3 and the copper spacer layer 5 being partly oxidized with oxygen. Egelhoff disclosed a spin valve head that oxidizes the copper spacer layer to greatly enhance the magnetoresistive effect (see pages 6144-6147). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to oxidize the

copper layers in the spin valve of JP'621 as taught by Egelhoff as doing this would enhance the GMR effect over that of a non-oxidized spin valve head, and would increase the beneficial specular reflection of electrons by creating a smoother or more well ordered pattern of the layers as taught by Egelhoff. It is noted that with regard to the dependent claims 3, 4, 6, 7, 12 and 13 the various gains in the spin valve performance (e.g. claim 3-- reduces the ferromagnetic coupling field without deteriorating GMR effect or resistance; claim 4—provides a negative coupling field without affecting GMR effect or resistance; claim 7-- provides stronger growth of NiFe(111) and NiMn(111) with respect to NiFe(200) and NiMn(002) phases; claim 12-- provides an approximately 15% increase in amplitude of the output of a NiMn spin valve head at the same coupling field; claim 13-- does not affect asymmetry performance) would all be inherent in oxidizing the copper layers in the JP'621 reference as the structure is the same as Applicant's NiMn top spin valve.

Allowable Subject Matter

3. Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

4. Applicant's arguments filed 1/18/05 have been fully considered but they are not persuasive.

Applicant asserts in pages 2-3:

> "Furthermore, Egelhoff states "the best spin valves are produced by deposition in a continuous background of 5 x 10^{-9} Torr (7 x 10^{-7} Pa) O_2. " In view of Fig. 2 and the above statement, Egelhoff discloses that a background of O_2 for the entire fabrication process is better than oxidizing only the copper spacer layer. Therefore, Egelhoff teaches away from Applicant's "oxidizing the copper seed layer in the NiMn top spin valve.""

The Examiner respectfully points out that using Egelhoff teaching would oxidize the seed layer and the spacer layer. In claim 1 it is not specified that the only oxidizing layer is the seed layer.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hayashi et al (U.S. Pat. 6,542,342) discloses a magnetoresistive effect transducer (figure 10 is a top spin valve) where only a copper seed layer is oxidized (column 8, lines 54-56, column 13, lines 14-20, column 19, line 1).

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Angel A. Castro whose telephone number is 571-272-7584. The examiner can normally be reached on Monday through Thursday, 8 AM to 6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William R. Korzuch can be reached on 571-272-7589. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Angel Castro C

ANGEL CASTRO
PRIMARY EXAMINER
Angel Castro, Ph.D.